

## **Design Standard Wiring Devices**

### **Purpose:**

This design standard has the purpose of creating a consistent application of wiring devices throughout the East Side Union High School District, therefore achieving a standard of functionality, maintenance, reliability and quality throughout all renovation and new building projects.

### **Design Standard:**

#### **1. General**

- a. Wiring devices include but are not limited to the following:
  - i. Wall Switches:
    1. Toggle type
    2. Pilot light toggle type (handle is on when load is energized)
    3. Lighted handle toggle type (handle is on when load is not energized)
    4. Key switches
  - ii. Receptacles:
    1. Duplex receptacles
    2. Isolated ground receptacles
    3. Ground Fault Circuit Interrupter (GFCI) receptacles
    4. Tamper Resistant receptacles
    5. Special Purpose Receptacles (NEMA type as applicable)
  - iii. Wall Dimmers
- b. Wall Switches and Convenience Receptacles are to be Ivory color. Use stainless steel wall plate covers.
- c. All wiring devices to meet the following requirements based on Code requirements and industry standard of care.
  - i. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
  - ii. Furnish products listed by UL or other testing firm acceptable to AHJ.
  - iii. Federal Specification Compliance: Comply with Federal Specification WS896 and WC596 for switches and receptacles respectively.
  - iv. NEMA Configuration: Comply with NEMA configurations and standards for general and special purpose wiring devices.
- d. Orientation:
  - i. Wall-Mounted Receptacles: Install with long dimension oriented

- vertically at centerline height shown on Drawings or specified herein. Ground pin on the bottom.
- ii. Vertical Alignment: When more than one outlet is shown on Drawings in close proximity to each other, but at different elevations, align the outlets on a common vertical center line for best appearance. Verify with Architect.
- e. Quality Control: Provide testing of wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for correct polarity, line to neutral, line to ground and neutral to ground faults. Contractor to correct any defective wiring.

## 2. Wall Switches

- a. During the schematic design phase, the design professional shall ascertain from ESUHSD the lighting design requirements for each space. For example:
  - i. Classrooms require switching to allow for room darkening to support projection while still providing adequate light for emergency egress, general circulation and note taking.
  - ii. Certain classrooms, for example for physics, art history or film, require total room darkening capability.
  - iii. Some curriculum may have other specific lighting and switching requirements.
  - iv. All office and instructional spaces require occupancy sensors and possibly daylight sensors, for energy efficiency.
  - v. Support areas like storerooms with windows should be equipped with vacancy sensors in series with the light switch.
  - vi. Restrooms (single or multiple fixtures[1]) should not have switch-controlled lighting; instead, they require occupancy sensors.
  - vii. Circulation areas, such as lobbies, vestibules, corridors and stairs, should have switch-controlled lighting; or, controlled by the BMS where available.
  - viii. Refer to Section 26 50 00 Lighting Design Standard for more information.
- b. Wall Switch Design Guidelines
  - i. Characteristics: Toggle type, quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage.
  - ii. Pilot Light Switches: Lighted handle, toggle type, red unless noted otherwise, neon pilot lamp. Pilot lamp energized when load is energized.
  - iii. Lighted Handle Switches: Lighted handle, quiet acting, 20 amp, 120/277 volt, toggle type, red unless noted otherwise, neon lamp. Lamp energized when load is not energized.

- iv. Key Switches: 20 amp/120-277 volt, black key guide. Schlage core, per Physical Access Control & Security Management System Design Standard.
- v. Finish: As selected by District. Provide District with optional colors for selection prior to specifying. In general, District prefers ivory switches.
- vi. Appearance: Provide lighting switches and receptacles of common manufacturer and appearance.
- vii. Brushed metal cover plates: stainless steel or bronze, to match other predominant architectural finishes.

### **3. Receptacles**

- a. During the schematic design phase, the design professional shall ascertain from ESUHSD the convenience receptacle design requirements for each space.
  - i. Instructional areas, conference rooms, and offices: In new construction, duplex convenience outlets should be installed every 6 feet and no more than 3 feet from any corner, to support users with laptops, chargers and other devices as well as to provide greatest flexibility in room use into the future. The same requirement applies to major renovations. However, this requirement is not reasonable for minor renovation projects. Provide quadplex outlet adjacent to each desk in offices and at instruction stations.
  - ii. Provide power for projection at front wall in classrooms and conference rooms.
  - iii. In large student union and learning center areas, provide duplex outlets every 6 feet along walls and no more than 3 feet from any corner. Also provide regularly spaced floor outlets to maximize flexibility.
  - iv. Circulation spaces: In new construction, convenience outlets should be installed to support custodial activities (plugging in vacuum cleaners, floor scrubbers, etc.). Large areas of circulation spaces should be considered informal learning areas that will be furnished, and that should include regularly spaced duplex receptacles to provide the greatest convenience and flexibility for facility users into the future.
  - v. For storage rooms, mechanical rooms, and electrical rooms provide a minimum of one duplex outlet for every 50 square feet or portion thereof.
  - vi. Provide a duplex outlet within 12 inches of each telephone/data outlet or wireless access point.
  - vii. Provide a dedicated circuit to serve building automation control panels.
  - viii. On the exterior of the building, provide a duplex outlet for every 100

linear feet of wall or portion thereof. Outlets shall be GFCI in a weatherproof while in-use enclosure. One of those outlets should be within 10 feet of each entrance.

b. Receptacles Design Guidelines

- i. Commercial Grade: Riveted. Brass ground contact on steel mounting strap. 20 amp.
- ii. Decorative Type: Back and side wired. 20 amp.
- iii. Isolated Ground Receptacle: Isolated ground "delta" on receptacle face, same finish as standard duplex receptacles, 20 amp.
- iv. Ground Fault Circuit Interrupter (GFCI) Receptacle: Meets or exceeds UL943 (Class A GFCI), UL498. Feed through type, back-and-side wired, 20 amp, 125VAC.
- v. Tamper-Resistant Receptacle: 20 amp, 125VAC, complies with CEC requirements for tamper-resistant outlets in areas where children are cared for.
- vi. UL Wet-Listed Covers While-In-Use: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord cap with bottom aperture for cord exit.
- vii. GFCI Outlets: One GFCI receptacle may be used to provide GFCI protection to downstream duplex receptacles on the same branch circuit provided the following conditions are met:
  1. The downstream receptacles are in the same room as the upstream GFCI duplex receptacles, and
  2. The downstream duplex receptacles are labeled as being protected by an upstream GFCI receptacle in the same room.

**4. Wall Dimmers**

- a. Size dimmers to accept connected load.
- b. Do not cut fins.
- c. Where dimmers are ganged together, provide a single multigang coverplate.

**Approved Manufacturers:**

- Cooper
- Hubbell
- Leviton
- Pass & Seymour

**Substitutes Allowed:**

Yes, if performance and quality equivalency can be evidenced.

## **Associated Design Standards and Construction Specifications:**

- Division 26 Electrical Design Standards

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